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Importance of Time Series of Satellite Images to Monitor Agricultural Fields in a Tropical Region

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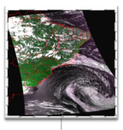
ABSTRACT - The main objective is to highlight the importance of the time series of digital images acquired by low spatial resolution satellites (AVHRR/NOAA and MODIS/Terra) to monitor the expansion and production of the sugarcane in the southeastern macro region of Brazil that have a huge amount of clouds during the growing season making the operational use of remote sensing data difficult.

It is important to emphasize that Brazil is the largest sugarcane producer in the world, making this agricultural product strategic for its economy and environment since it is the main renewable source of energy used to replace fossil fuels and reduce the emissions of greenhouse gases that cause the global warming.

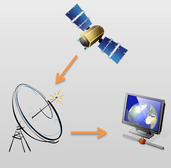
Method and Objective

- Data Mining
- Agricultural monitoring, forecast and planning

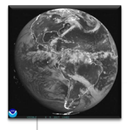
Satellite Image Time Series Past and Present



- AVHRR/NOAA
- AVHRR/MetOp
- MODIS/Terra
- Image database since 1995

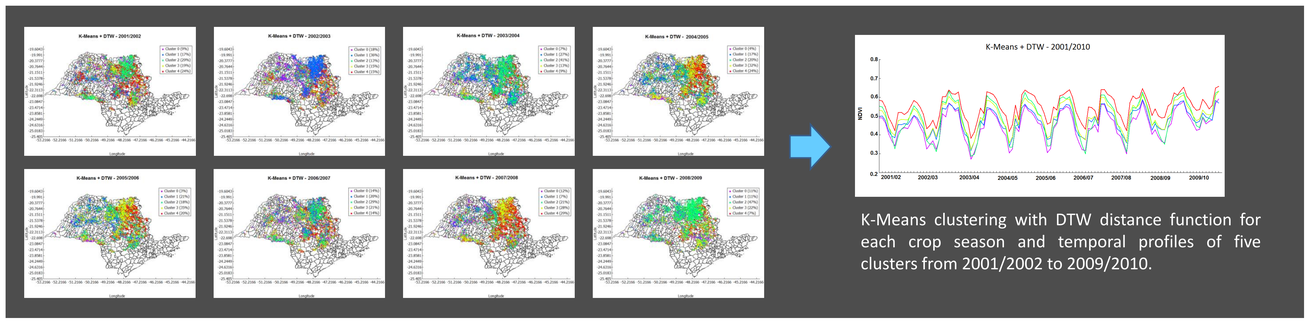


Satellite Image Time Series Present and Future

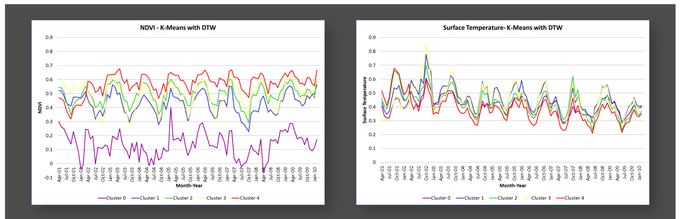


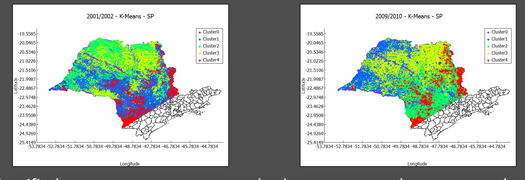
- Geonetcast
- Goes 16

RESULTS

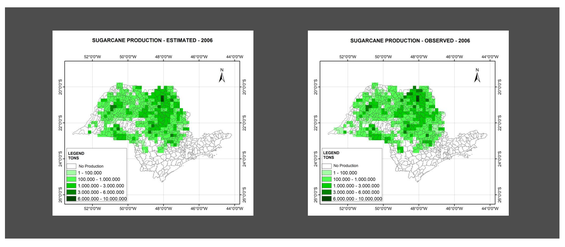


K-Means clustering with DTW distance function for each crop season and temporal profiles of five clusters from 2001/2002 to 2009/2010.

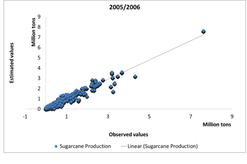




The identified areas were sugarcane and other targets, such as water, urban area, agriculture crops, grasslands and forests in the state of São Paulo.



$$Production_{2006} = 802.800 + NDVI_{2005} * 358.400 + Area_{2005} * 86{,}36 + WRSI_{2005} * -1.137.000$$



Remote sensing and climate data are important to estimate the production of agricultural crops. The models proposed using the variables planted area, NDVI and WRSI presented correlation coefficients (R^2) around 0.9 and are able to estimate the sugarcane production for the state of São Paulo.

CONCLUSION -

The current challenge to improve the agricultural monitoring, forecast and planning, that are strategic for a country with continental dimensions and great diversity of land-uses, is to adapt the methods and techniques already developed and published by researchers from Unicamp (University of Campinas), Embrapa (Brazilian Company for Agricultural Research) and USP (University of São Paulo) after ten years of joint activities, based on AVHRR/NOAA data recorded at Unicamp since April 1995 and MODIS/Terra available in public databases, to the new generation of satellite images, such as those acquired by the GOES 16.